

IN THE CLAIMS:

Please amend the claims as follows:

Claims 1-14 (Canceled)

15. A learning/thinking machine based on a structured knowledge comprising:

means for extracting a semantic relation from collected information in accordance with a plurality of rules;

means for analyzing information based on the extracted semantic relation and in which a link indicates a semantic relation between a node and a node for indicating meaning so as to sufficiently express a semantic means, said node and said link have structure so as to exchange their roles and a knowledge expressed by said node and said link is stored;

means for generating new information according to predetermined inference by verifying a knowledge based in which knowledge structured based on said semantic relation is stored in response to an inquiry or request with a unit in which a relating node is stored;

means for evaluating generated new information;

means for judging sequencing of evaluated results;

means for deciding an optimal solution based on a judged result;

an input unit for receiving an inquiry or request from the outside; and

verifying means for verifying said inquiry or request from the outside with said knowledge base, wherein if it is determined by the verified result of said verifying means that said inquiry or request are completely coincident with said knowledge base, then understanding of such coincidence is transmitted to a central unit, if it is determined by the verified result of said verifying means that said inquiry or request are partly coincident with said knowledge base, then said knowledge based and said unit in which said relating node is stored are verified and

said information generating means supplements insufficient information and generates information so that knowledge structured by said node and said link based on said semantic relation has new semantic content and new semantic relation.

16. (New) A learning/thinking method based on a structured knowledge comprising:

a knowledge input step for inputting inclusively collected data, information and knowledge;

a knowledge structuring step in which a semantic relation is extracted from said inputted data, information and knowledge in accordance with a plurality of rules, meaning of information is analyzed based on said extracted semantic relation, a link indicates a semantic relation between a node and a node for indicating a meaning, said node and said link have structures so as to exchange their roles and structured knowledge expressed by said node and said link is stored;

an information generating step for generating new information by predetermined inference such that a knowledge structured by said node and said link based on said semantic relation has new semantic content and semantic relation;

a value judging step for evaluating and judging a new knowledge of generated information by verifying said information generated result with said knowledge base;

a knowledge increasing step for accumulating said evaluated/judged result and new information generated knowledge in said knowledge base to increase knowledge; and

an optimal solution deciding step for deciding and outputting an optimal solution in response to an inquiry or request from then outside, wherein said information generating step comprises:

a relating node retrieving step for retrieving only a unit in which a relating node is stored;

a relating link retrieving step for retrieving only a unit in which a relating link is stored;
and

a step for executing inference by using at least any one of analogical reasoning, inductive inference, abduction and association based on a retrieved result of said relating node retrieving step or said relating link retrieving step.

17. (New) In a learning/thinking method based on a structured knowledge according to claim 16, a learning/thinking method based on a structured knowledge characterized in that said evaluating and judging step comprises:

a step for evaluating new information generated knowledge item by item with reference to the knowledge that has already been stored in said knowledge base;

a step for determining whether or not said new generated knowledge satisfies an inquiry request, setting said knowledge as a nominated solution if said knowledge satisfies said request and searching and evaluating other results item by item if said knowledge does not satisfy said request;

a step for sequencing said nominated knowledge with reference to said knowledge base;
and

a step for extracting/deciding nominated knowledge whose target necessary condition is optimum from sequenced nominated knowledge.

18. (New) In a learning/thinking method based on a structured knowledge according to claim 16, a learning/thinking method based on a structured knowledge characterized in that said knowledge generating step comprises:

a step for determining whether or not new knowledge information generated at said information generating step and which is generated at said evaluating/deciding step as an optimal solution is increased as a new node;

a step for storing said new node in a unit integration memory if it is determined that said new information is increased as said new node;

a step for determining said generated new knowledge is increased as a link regardless of the increase of said node; and

a step for storing said new link in said unit integration memory if it is determined that said generated new knowledge is increased as said new link.

19. (New) In a computer system in which a central control computer and a plurality of cell computer are coupled so as to communicate with each other, a computer system characterized in that:

said central control computer stores therein only addresses of said plurality of cell computer before being operated, said central control computer can input a question to said plurality of cell computers and can output an answer to said question;

said plurality of cell computers have nodes each indicating meaning and a link indicating a semantic relation between the nodes, said node and said link have structures so as to exchange their roles and each cell computer stores therein information of one node or link and information of other cell computer storing therein a node or link having a connection of a semantic relation to said node or link in order to hold structured knowledge expressed by said node and said link;

when a question is inputted, said question is transmitted from said central control computer to all of said plurality of cell computer, as presupposed operation, said plurality of cell computers are changed to a processing target state or unsuitable state based on connection

information of a semantic relation of a knowledge which each of said plurality of cell computers has relative to said question;

a cell computer having no semantic relation to said question is placed in the unsuitable state to return information indicative of the unsuitable state to said central control computer and only a cell computer having a connection of a semantic relation is placed in the processing target state to return an answer to said central control computer; and

said central control computer continues to output a question to only said cell computer placed in said processing target state, said central control computer analyze an answer from said cell computer in said processing target state and understands a meaning of said answer to generate new information, converts said generated new information into an output form corresponding to said question and outputs said converted information as an answer.

20. (New) In a computer system according to claim 19, a computer system characterized in that:

said central management computer comprises:

a request condition analyzing unit for analyzing a condition of an inputted question when a question is inputted to said input unit;

a request condition processing target cell detecting unit for transmitting a request condition to all cell computers based on said analyzed request condition, receiving a reply of the unsuitable state from an unsuitable cell computer and detecting a processing target cell computer from all of said cell computers except said unsuitable cell computer in response to said request condition;

a retrieval transmitting and receiving unit for continuing to retrieve only said detected processing target cell computer, receiving a retrieval answer from said processing target cell computer and analyzing a retrieved result based on said received retrieval answer;

a semantic understanding/information generating unit for executing semantic understanding and information generation from said analyzed retrieved result to generate new information;

an output information converting unit for converting generated new information into a requested output form;

a cell connection destination address memory unit for storing therein an address of a connection destination cell computer having a semantic connection based on said generated new information in such a manner that said address can be updated sequentially; and

an answer output unit for outputting said generated new information in the requested output form.

21. (New) IN a computer system according to claim 19, a computer system characterized in that:

said plurality of cell computers comprises:

a request condition processing target judging unit for determining by using decision information indicative of the presence or absence of a connection destination cell computer whether or not its own cell computer becomes a processing target in response to the request condition simultaneously transmitted from said central management computer to all cell computers;

an unsuitable relay/connection destination cell communicating unit for returning an information indicative of an unsuitable state to said central management computer if its own cell

computer is unsuitable for said request condition and transmitting information indicative of the processing target state of a connection destination cell computer if its own cell computer becomes a processing target in response to said request condition;

a retrieval receiving unit for receiving retrieval information from said central management computer if its own cell computer becomes the processing target in response to said request condition;

a connection destination judging unit for retrieving other connection destination cell computer which its own cell computer has information connection in response to said request condition and determining by using information of said connection destination cell computer whether or not retrieval based on retrieval information can be executed at every said request condition;

a retrieval answer unit for returning an answer of said executed retrieval to said central management computer;

a knowledge memory unit for storing knowledge obtained based on said retrieval information and said answer of retrieval such that said knowledge can be updated sequentially; and

a connection destination cell memory unit for storing a connection destination cell computer corresponding to said obtained knowledge such that said connection destination cell computer can be updated sequentially.

22. (New) In a computer system according to claim 21, a computer system characterized in that:

said connection destination judging unit comprises:

step number N retrieving means for retrieving a path in which said request condition has a structure of a step number N (natural number);

tree-like path retrieving means for retrieving a path in which said request condition has a tree-like structure; and

loop-like path retrieving means for retrieving a path in which said request condition has a loop-like path to thereby judge a connection corresponding to said request condition structure.

23. (New) In an information generating method using a computer system in which a central control computer and a plurality of cell computers are coupled so as to communicate with each other, an information generating method characterized in that:

said central control computer stores therein only addresses of said plurality of cell computer before being operated, said central control computer can input a question to said plurality of cell computers and can output an answer to said question; and

said plurality of cell computers have nodes each indicating meaning and a link indicating a semantic relation between the nodes, said node and said link have structures so as to exchange their roles and each cell computer stores therein information of one node or link and information of other cell computer storing therein a node or link having a connection of a semantic relation to said node or link in order to hold structured knowledge expressed by said node and said link;

said information generating method comprises:

a step in which when a question is inputted, said question is transmitted from said central control computer to all of said plurality of cell computer;

a step in which as presupposing operation, said plurality of cell computers are changed to a processing target state or unsuitable state based on connection information of a semantic

relation of a knowledge which each of said plurality of cell computers has relative to said question;

a step in which a cell computer having no semantic relation to said question is placed in the unsuitable state to return information indicative of the unsuitable state to said central control computer and only a cell computer having a connection of a semantic relation is placed in the processing target state to return an answer to said central control computer;

a step in which said central control computer continues to output a question to only said cell computer placed in said processing target state; and

a step in which said central control computer analyze an answer from said cell computer in said processing target state and understands a meaning of said answer to generate new information, converts said generated new information into an output form corresponding to said question and outputs said converted information as an answer.

24. (New) In an information generating method according to claim 23, an information generating method characterized in that:

said central management computer including:

a step for analyzing a condition of an inputted question by a request condition analyzing unit when a question is inputted to a question input unit;

a step for transmitting said request condition to all cell computers by a request condition processing target cell detecting unit based on said analyzed request condition, receiving an answer indicative of the unsuitable state from an unsuitable cell computer and detecting a cell computer, which becomes a processing target in response to the request condition, from said all cell computers excepting said unsuitable cell computer;

a process for continuing to effect the later retrieving operation on said detected processing target cell computer by a retrieval transmitting and receiving unit to receive a retrieval answer from said processing target cell computer;

a step for analyzing the retrieved result by a retrieved result analyzing unit based on said received detected retrieval answer;

a step for understanding meaning and generating information from said analyzed result by the semantic understanding/information generating unit;

a step for converting said generated new information into a requested output form by the output information converting unit;

a step for storing an address of a connection destination cell computer having a semantic connection based on said generated new information such that said address can be updated sequentially; and

a step for outputting said generated new information in the requested output form by the answer output unit.

25. (New) In an information generation method according to claim 23, an information generation method characterized in that:

said plurality of cell computers includes:

a step in which it is determined at a request condition processing target judging unit by using judgment information indicative of presence or absence of a connection destination cell computer in response to request conditions simultaneously transmitted from said central management computer to all cell computers whether or not its own cell computer becomes a processing target;

a step in which an unsuitable state is returned to said central management computer if its own cell computer is unsuitable for said request condition and in which the processing target state is transmitted to the connection destination cell computer by the unsuitable reply/connection destination communicating unit if its own cell computer becomes a processing target for said request condition;

a step for receiving retrieval information from said central management computer by a retrieval receiving portion if its own cell computer become a processing target relative to said request condition;

a step for retrieving other connection destination cell computer which its own cell computer has an information connection in response to said request condition and in which it is determined at a connection destination judging unit by using information of said connection destination cell computer whether or not said retrieval based on said retrieval information can be executed for every said request condition;

a step for returning said retrieval answer to said central management computer by a retrieval answer unit;

a step for storing said retrieval information and a knowledge obtained based on an answer of a retrieval in a knowledge memory unit such that they can be updated sequentially; and

a step for storing a connection destination cell computer corresponding to said obtained knowledge in a connection destination cell memory unit such that it can be updated sequentially.

26. (New) In an information generating method according to claim 25, an information generating method characterized in that:

said decision step of said connection destination judging unit includes:

a step for determining whether or not there is a connection destination cell computer at a node number N including its own cell computer in an operation for searching a path having a step number N (natural number) in a connection decision having a request condition structure;

a step for determining based on information indicative of the fact that there is a connection destination cell computer at a node number N that cell computer including its own cell computer having said node number N are placed in the processing target state and in which information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these cell computers are to be moved to the processing target state; and

a step in which it is determined based on information indicative of the fact that there is no connection destination cell computer at said node number N that cell computer including its own cell computer having other node number are placed in the unsuitable state, information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these cell computers are to be moved to the unsuitable state and in which information indicative of said unsuitable state and in which information indicative of said unsuitable state is transmitted to said central management computer.

27. (New) In an information generating method according to claim 25, an information generating method characterized in that:

said decision step of said connection destination judging unit includes:

a step in which when a tree-like path including its own cell computer is retrieved in the operation for retrieving a tree-like path in a connection decision based on a request condition structure, it is determined whether or not a tree-like connection destination cell computer including its own cell computer is placed at the end, it is sequentially determined that cell

computers at the end are placed at end so that it is determined that all of tree-like connection destination cell computer are placed at the end;

a step in which it is determined based on information indicative of the fact that all tree-like connection destination cell computer are placed at the end that cell computers at the end are placed in the processing target state so that it is determined that all tree-like connection destination cell computers are placed at the processing target state and that information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these cell computers are to be moved to the processing target state; and

a step in which it is determined that all remaining loop-like connection destination cell computers except tree-like connection destination cell computers in the processing target state are placed in the unsuitable state so that information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these computers are to be moved to the unsuitable state and that information indicative of the unsuitable state is transmitted to said central management computer.

28. (New) In an information generating method according to claim 25, an information generating method characterized in that:

said decision step of said connection destination judging unit includes:

a step in which when loop-like connection destination cell computer including its own cell computer are retrieved in the operation for retrieving a loop-like path in the connection decision based on the request condition structure, it is determined whether or not tree-like connection destination cell computers including its own cell computer are placed at the end, it is determined that connection destination cell computers at the end also are not belonging to a loop

so that it is determined that all tree-like connection destination cell computers also are not belonging to the loop;

a step in which it is determined based on information indicative of the fact that all tree-like connection destination cell computers are placed at the end that cell computers at the end are placed in the unsuitable state so that it is determined that all tree-like connection destination cell computer are placed in the unsuitable state, information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these cell computers are to be moved to the unsuitable state and in which information indicative of the unsuitable state is transmitted to said central management computer;

a step for determining whether or not there is a cell computer including its own cell computer at a node number N (natural number);

a step in which tree-like connection destination cell computer in the unsuitable state are removed, it is determined by further decision of the node number N that remaining loop-like connection destination cell computer having the node number N are placed at the processing target state and information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer so that these cell computers are to be moved to the processing target state; and

a step in which it is determined based on information indicative of the fact that there is no connection destination cell computer at the node number N that cell computers including its own cell computer having other node number are placed in the unsuitable state so that information is transmitted through said unsuitable reply/connection destination cell communicating unit to said central management computer such that these cell computers are to be moved to the unsuitable

state and that information indicative of the unsuitable state is transmitted to said central management computer and adjacent cell computers.